

## KSC In-Situ Resource Utilization (ISRU) Technologies

Completed Technology Project (2014 - 2016)



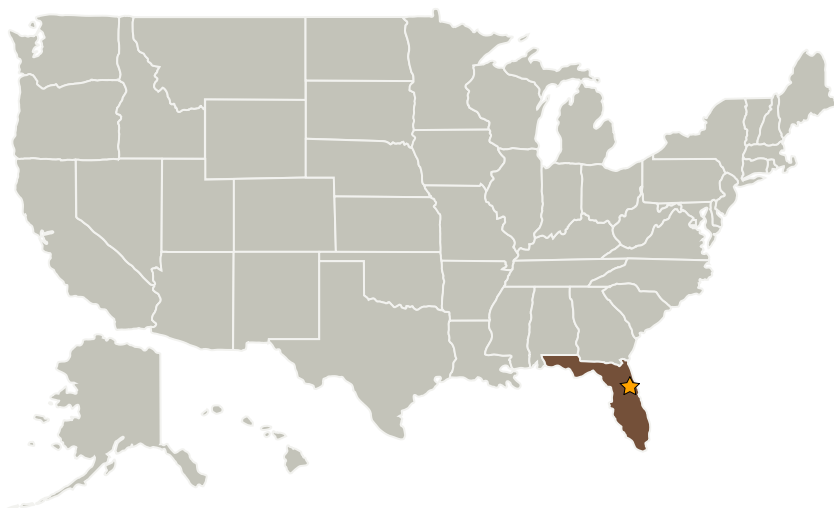
## Project Introduction

(1) Identify and evaluate CO<sub>2</sub>/CO separation technologies that are compatible with the high operating temperatures (700-850oC) of the Solid Oxide Electrolysis process. (2) Identify and evaluate CO<sub>2</sub> Acquisition technology options. (3) MARCO POLO Atmospheric Processing Module (APM): verify the operation of the CO<sub>2</sub> pump and the associated storage system, complete setup and testing of the Sabatier subsystem and operate it with the CO<sub>2</sub> freezers to ready the APM for a potential analog demonstration with other components of MARCO POLO at KSC and/or JSC.

## Anticipated Benefits

NASA funded: MARCO POLO can be the starting point for the new Advanced Exploration Systems (AES) ISRU project for a long-term ground demonstration of a Mars ISRU system to produce oxygen at 0.200 kg/h or more. NASA unfunded: The MARCO POLO Atmospheric Processing Module (APM) provides a technology demonstration of one part of a Mars Propellant Production System capable of producing 0.44 kg of methane and 1.77 kg of oxygen per 14 h day, which would be sufficient for a small Mars Sample Return mission. The ground prototype could lead to an ISRU system on the proposed 2024/2026 Mars Surface Pathfinder that would demonstrate key technologies for crewed missions.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Kennedy Space Center (KSC)

**Responsible Program:**

Game Changing Development

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| Organizations Performing Work | Role              | Type        | Location                      |
|-------------------------------|-------------------|-------------|-------------------------------|
| ★ Kennedy Space Center(KSC)   | Lead Organization | NASA Center | Kennedy Space Center, Florida |

## Primary U.S. Work Locations

Florida

## Project Transitions

 **October 2014:** Project Start **September 2016:** Closed out

## Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

## Project Management

**Program Director:**

Mary J Werkheiser

**Program Manager:**

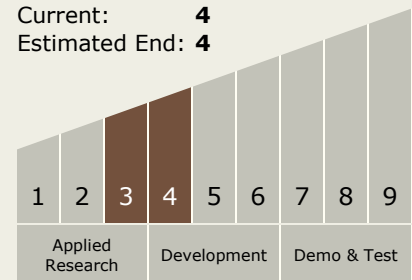
Gary F Meyering

**Principal Investigator:**

Daniel J Barta

## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



## Target Destination

Mars